

# CASE STUDY

## Washington, D.C.'s Clean Air Cab: "America's first natural gas cab company"



*Todd Ruelle and Jim Doyle began with a dream – to start a new kind of cab company that would be unlike any other in the Washington, D.C., area. Their cabs would be clean and environmentally friendly – from the mats on the floor to the fuel used in the engines. The Clean Air Cab Company became a reality in 1993. Customers seem to appreciate the company's clean and courteous service and its responsible attitude toward the environment. Business is booming and expansion plans are under way.*

### **Early Decisions**

Right from the start, Ruelle and Doyle planned to use alternative-fuel vehicles (AFVs); that's why they chose the name, "Clean Air" Cab Company. But which alternative fuel would meet the daily demands of a taxicab fleet? They considered electricity, natural gas, and propane – all cleaner than gasoline.

Limited range and cost quickly eliminated electric vehicles. Ruelle and Doyle settled on compressed natural gas (CNG) instead of propane because of a single limiting factor – fuel availability. Washington Gas Light Company, the local natural gas utility, made four of its fueling stations accessible to Clean Air Cab. Two privately operated stations also were available. Propane, on the other hand, could be found at only two locations in the entire metropolitan area.

Once they had chosen their fuel, Ruelle and Doyle had to select vehicles. When Clean Air Cab was launched in 1993, original equipment manufacturers (OEMs) did not manufacture the larger sedans (with enhanced suspension, braking, and cooling systems) required by taxicab companies as natural gas vehicles (NGVs). Ruelle and Doyle opted to convert their first car, a Chevrolet Caprice, to run on either CNG or gasoline. In late 1993, they purchased and converted five more Caprices. Their decision to go with bi-fuel vehicles proved to be a good one.

During the early years of operation, the ability to run on gasoline saved the day more than once when none of the six local CNG filling stations was nearby when a vehicle needed refueling.



By early 1994, the network of local CNG filling stations had expanded enough to give Ruelle and Doyle confidence in enlarging their fleet. They purchased 10 Ford Crown Victorias that were then converted to run solely on CNG. [Editor's Note: In late 1995, Ford began producing the Crown Victoria as a dedicated CNG vehicle.]

#### ***Conversions: Learning by Experience***

Ruelle and Doyle found that conversions cost about \$4,000 per cab, including the CNG conversion kits, fuel tanks, and labor. Much of that initial cost was defrayed by a demonstration grant from the U.S. Department of Energy (DOE), which amounted to about \$7,500 per month over 15 months, or about \$112,500. In return, the company performed reporting services.

The vehicles were converted by a company recommended by Washington Gas. The company was also certified by both Ford and Chevrolet to convert their

vehicles. Four tanks installed in each cab provided a total fuel capacity of 10.5 gasoline gallons equivalent (gge) in the Caprice and 12 gge in the Crown Victoria. Two different conversion systems from two different manufacturers were used with radically different results.

Thirteen cabs were converted with a kit of mostly electronic parts, and two were converted with a kit of mostly mechanical parts. The vehicles converted with mechanical kits have each been driven more than 100,000 miles with no problems. On the other hand, 40% of the electronic kits failed in the first year after installation. According to Clean Air Cab, service was very difficult to obtain for the electronic kit, and because the warranty had expired, the manufacturer would not supply parts.

Although the cab company would have preferred to replace all the electronic systems with mechanical ones, financial considerations precluded that solution. Each system requires different engine modifications and would have required starting from scratch again on each vehicle.

Because of its experience with conversions, the Clean Air Cab Company plans to purchase any future NGVs directly from the OEM dealer, where fleet discounts are often available.

General Manager Paul Seidl strongly recommends that fleet owners purchase their vehicles from OEMs rather than installing conversions, for two key reasons. First, OEMs offer full warranties on their AFVs, which prevents "finger-pointing" if problems occur. With conversions, in contrast, Seidl says that questions arose about whose responsibility it was to correct

problems: the OEM or the conversion system vendor or manufacturer. Seidl also suggests buying any extended warranty packages offered.

Second, trunk space is very important for taxicabs. Seidl believes that the OEMs are better able to optimize the configuration of the fuel tank storage area in the trunks to use as little space as possible. Although the CNG tanks occupy about half of the trunk space, both the Caprice and Crown Victoria have large, roomy trunks that can still hold most customers' luggage.

Seidl advises companies considering vehicle conversion to take advantage of the bi-fuel system, however, simply because it gives drivers a little "breathing room" if the alternative fuel is not readily accessible.

#### ***Finding Fuel Gets Easier***

The network of CNG fueling stations in the Washington, D.C., metropolitan area has grown dramatically since 1993, and many stations are now open to the public. The Clean Air Cab Company reports that the expanding number of CNG fueling stations in its service area makes it easy for its drivers to refuel. As an added convenience, the fuel provider, Washington Gas, has issued credit cards that Clean Air Cab's drivers can use at any CNG fueling station.

The cabs typically get about 15.5 miles per gge when running on CNG. On the basis of the typical stop-and-go driving patterns of cabs, the company estimates that its vehicles achieve a range of 140-150 miles, and its drivers refuel with CNG about once a day. Drivers of the bi-fuel Chevrolet Caprices use gasoline only about 10% of the time.

#### **Fleet Facts**

**Fleet Type:** Taxicab

**Fleet Size:** 15 (soon to be 20)

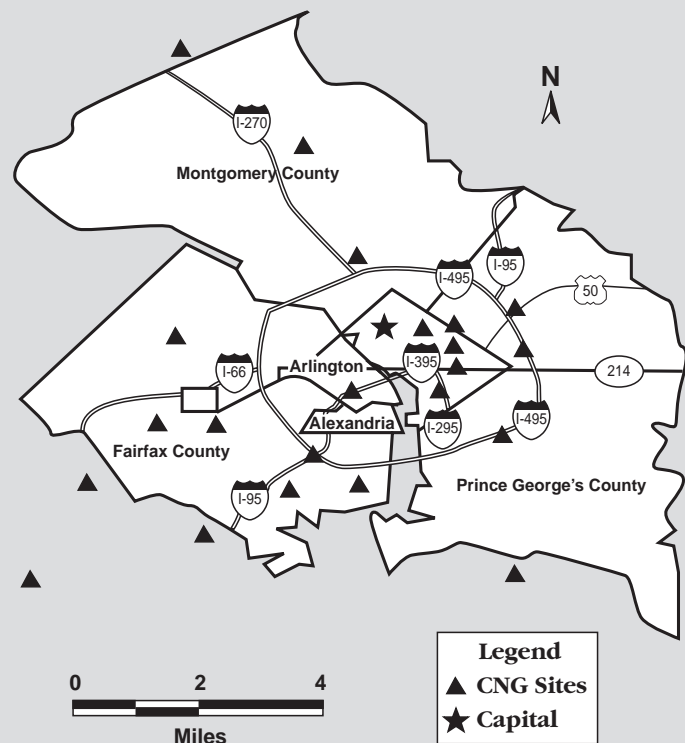
**Alternative Fuel:** CNG

**Vehicles:** 5 bi-fuel Chevrolet Caprices and 10 dedicated Ford Crown Victorias

**Location:** Washington, D.C.

**Mileage Accumulation:** 1,000 miles per week

#### **District of Columbia Compressed Natural Gas Refueling Facilities**



### ***Fuel Costs and Payback***

In 1996, Clean Air Cab paid full pump prices for CNG, ranging from \$0.75 to \$0.94 per gge. The company reports that it saves about \$0.30-0.50 per gge (approximately \$0.03 per mile) over the average price of gasoline (\$1.25 per gallon) in Washington, D.C. It expects to pay back its incremental investment in the AFVs in about 2.5 years.

Although the company has not been in business long enough to operate its vehicles for the typical 15- to 17-year lifetime that cabs have in Washington, D.C., they expect to use their NGVs long after the 2.5 year payback period. Moreover, the payback period analysis does not include the DOE demonstration grant.

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### ***Payback Analysis***

#### ***Mileage Accumulation***

$$\left( \frac{1,000 \text{ miles}}{\text{week}} \right) \left( \frac{52 \text{ weeks}}{\text{year}} \right) = \mathbf{52,000 \text{ miles/year}}$$

#### ***Fuel Economy***

*15.5 miles/gge of CNG*

#### ***Fuel Cost Savings***

$$\left( \frac{\$1.25}{\text{gal. gasoline}} \right) - \left( \frac{\$0.84}{\text{gge of CNG}} \right) = \mathbf{\$0.41/\text{gge of CNG}}$$

#### ***Savings per Mile***

$$\left( \frac{\$0.41}{\text{gge of CNG}} \right) \div \left( \frac{15.5 \text{ miles}}{\text{gge of CNG}} \right) = \mathbf{\$0.03\text{¢/mile}}$$

#### ***Payback Period***

$$(\$4,000.00) \div \left( \frac{\$0.03}{\text{mile}} \right) = \mathbf{130,000 \text{ miles}}$$

$$(130,000 \text{ miles}) \div \left( \frac{52,000 \text{ miles}}{\text{year}} \right) \cong \mathbf{2.5 \text{ years}}$$

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### ***Low Maintenance Requirements***

Clean Air Cab has accumulated more than 1.3 million miles on its 15 dedicated and bi-fuel NGVs and reports no unusual routine maintenance problems. In fact, the company has relaxed the schedule for oil changes from every 3,000 miles to once every 5,000-6,000 miles, because of its belief that the cleaner-burning CNG causes less wear and tear on cab engines.

Seidl reports that a mechanic of lengthy experience tore down and rebuilt one of the bi-fuel Chevrolet Caprice's engines after 100,000 miles of operation. The mechanic was astounded at how "incredibly clean" the engine was and attributed what little carbon build-up there was to the limited use of gasoline in the engine. On the basis of this experience, the company decided to relax its schedule for oil changes.

The cab company uses 5W30 oil – the same grade used in gasoline engines. However, because CNG burns hotter than gasoline, Seidl recommends using high-performance (e.g., platinum) spark plugs and heavy-duty spark plug wires. With these minor exceptions, the Clean Air Cab Company follows manufacturer's guidelines for maintenance.

### ***Driver Training and Acceptance***

Clean Air Cab Company reports that drivers need very little training. They receive a short orientation on the differences between NGVs and gasoline-powered cabs, and safety information is included with the instructions for refueling. Seidl says that his drivers are very satisfied with their NGVs and have noticed only small differences in performance when operating on CNG.

### **By the Numbers**

**Conversion Cost:** \$4,000/vehicle

**Fuel Cost:** \$0.80-1.00 on a gasoline-gallon-equivalent (gge) basis

**CNG Tank Capacity:** 4 tanks totaling 10.5 gge of CNG per cab

**Fuel Economy:** 15.5 miles per gge of CNG

**Range on CNG Fuel:** 140-150 miles per cab

**Payback:** 200,000 miles, or 4 years

### ***Future Looks “Clean” and Bright***

Clean Air Cab Company expects to add about five more NGVs to its general fleet over the next few years. It will also purchase 20-25 NGVs that will carry only passengers who have accounts with the company. Much of the expansion can be credited to the company's approach to customer service and salesmanship. Not only are the cabs kept extremely clean, but customers also have the option of paying for fares by credit card. And who wouldn't be enticed to flag down a cab painted a cheery blue with fluffy

white clouds? All the cabs proudly display a decal, “Powered by Natural Gas.” The company's ad in the Yellow Pages tells potential customers that “A Ride With Us Is A Breath of Fresh Air,” and they offer “Same Low Fares, Cleaner Air.”

### ***For more information, contact:***

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### ***Disclaimer***

This case study is intended only to illustrate approaches that organizations could use in adopting AFVs in their fleets. The data cited here, although real experience for the fleet discussed in this case study, may not be replicated for other fleets. For more comprehensive information on the performance of AFVs and other related topics, please call (800/423-1363) or e-mail ([hotline@afdc.nrel.gov](mailto:hotline@afdc.nrel.gov)) the National Alternative Fuels Hotline.